TABLE 1.—*Free-air temperatures, relative humidities, and vapor pressures during February, 1923.*

TEMPERATURE (°C.).

Altitude, m. s. l. (m.)	Broken Arrow, Okla. (233m.)		Drexel, Nebr. (396m.)		Due West, S. C. (217m.)		Ellendale, N. Dak. (444m.)		Groesbeck, Tex. (141m.)		Royal Center, Ind. (225m.)	
	Mean	Departure from 5-yr. mean.	Mean	Departure from 8-yr. mean.	Mean	Departure from 2-yr. mean.	Mean	Departure from 6-yr. mean.	Mean	Departure from 5-yr. mean.	Mean	Departure from 5-yr. mean.
Surface	3.4	−1.6	−6.3	−1.9	9.0	−0.9	−13.7	−2.6	9.4	−0.8	−5.4	−3.1
250	3.3	−1.6	.....	.....	8.8	−0.9	.....	.....	9.1	−0.7	−5.6	−3.1
500	1.5	−1.8	−6.8	−1.9	7.3	−1.0	−13.8	−2.7	8.4	−0.4	−7.8	−3.4
750	0.8	−1.5	−7.7	−2.4	6.3	−1.1	−13.7	−3.0	8.2	−0.3	−8.6	−3.4
1,000	0.5	−1.4	−7.7	−3.0	5.6	−1.1	−13.1	−2.9	7.4	−0.8	−8.8	−3.2
1,250	0.4	−1.3	−7.5	−3.4	5.0	−0.9	−12.5	−2.9	6.6	−1.0	−9.4	−3.2
1,500	−0.2	−1.2	−7.5	−3.3	4.5	−0.7	−12.4	−3.0	5.9	−1.0	−9.6	−3.0
2,000	−1.6	−1.2	−8.2	−3.0	2.4	−0.9	−13.4	−2.9	5.0	−0.1	−10.2	−2.5
2,500	−3.7	−1.0	−10.0	−2.7	−0.3	−1.0	−15.2	−2.7	3.3	+0.3	−11.9	−2.7
3,000	−6.2	−1.0	−12.2	−2.4	−2.3	−1.0	−18.2	−3.0	0.8	+0.2	−13.7	−2.3
3,500	−7.6	−0.2	−14.6	−2.1	−4.9	−1.7	−20.3	−2.5	−2.0	−0.3	−15.7	−1.8
4,000	−10.4	0.0	−16.0	−0.7	.....	.....	−23.1	−2.7	−4.0	+0.1	−18.5	−1.8
4,500	.....	.....	.....	.....	.....	.....	−26.5	−3.3	−5.5	+0.3	.....	.....
5,000	.....	.....	.....	.....	.....	.....	.....	.....	−8.1	+0.3	.....	.....

RELATIVE HUMIDITY (PER CENT).

Surface	62	−4	71	−6	66	−4	88	+6	80	+5	79	+2
250	62	−4	.....	.....	66	−4	.....	.....	78	+5	79	+2
500	61	−4	70	−6	65	−3	85	+4	72	+2	81	+4
750	58	−4	67	−5	64	−3	74	−1	70	+4	78	+3
1,000	55	−2	63	−4	62	−4	68	−3	72	+10	74	+3
1,250	53	0	61	−2	62	−3	63	−4	72	+13	71	+4
1,500	53	+2	58	−1	61	−2	58	−5	67	+12	67	+4
2,000	49	0	57	+2	59	0	55	−6	55	+7	57	+1
2,500	45	−3	55	+2	56	−3	56	−6	50	+6	53	−1
3,000	40	−4	51	−2	53	−2	54	−6	48	+6	49	−5
3,500	34	−6	46	−7	54	+1	44	−14	50	+10	43	−11
4,000	32	−6	43	−7	.....	.....	39	−18	43	+8	39	−14
4,500	.....	.....	.....	.....	.....	.....	41	−13	24	+2	.....	.....
5,000	.....	.....	.....	.....	.....	.....	.....	.....	22	+2	.....	.....

TABLE 1.—*Free-air temperatures, relative humidities, and vapor pressures during February, 1923*—Continued.

VAPOR PRESSURE (*mb.*).

Altitude, m. s. l. (m.)	Broken Arrow, Okla. (233m.)		Drexel, Nebr. (396m.)		Due West, S. C. (217m.)		Ellendale, N. Dak. (444m.)		Groesbeck, Tex. (141m.)		Royal Center, Ind. (225m.)	
	Mean	Departure from 5-yr. mean.	Mean	Departure from 8-yr. mean.	Mean	Departure from 2-yr. mean.	Mean	Departure from 6-yr. mean.	Mean	Departure from 5-yr. mean.	Mean	Departure from 5-yr. mean.
Surface	5.06	−0.99	2.81	−0.85	8.33	−10.0	2.09	−0.31	10.41	+0.49	3.42	−0.80
250	5.02	−0.98	.....	.....	8.23	−0.98	.....	.....	9.93	+0.49	3.36	−0.80
500	4.38	−0.94	2.68	−0.80	7.48	−0.84	2.00	−0.36	8.86	+0.44	2.94	−0.72
750	3.94	−0.75	2.42	−0.72	6.94	−0.85	1.72	−0.49	8.38	+0.65	2.72	−0.60
1,000	3.72	−0.48	2.20	−0.75	6.48	−0.82	1.66	−0.49	8.00	+1.01	2.53	−0.54
1,250	3.52	−0.28	2.14	−0.67	6.18	−0.62	1.63	−0.46	7.39	+1.10	2.27	−0.47
1,500	3.27	−0.18	2.01	−0.58	5.73	−0.53	1.41	−0.55	6.31	+0.86	2.06	−0.38
2,000	2.64	−0.19	1.74	−0.43	4.50	−0.38	1.19	−0.50	4.38	+0.27	1.58	−0.37
2,500	2.04	−0.34	1.42	−0.37	3.33	−0.55	1.00	−0.43	3.65	+0.35	1.35	−0.32
3,000	1.41	−0.47	1.07	−0.40	2.70	−0.37	0.64	−0.45	3.12	+0.35	1.15	−0.23
3,500	1.04	−0.45	0.69	−0.46	2.56	−0.36	0.34	−0.47	2.79	+0.56	0.95	−0.12
4,000	0.78	−0.34	0.45	−0.39	.....	.....	0.21	−0.44	2.19	+0.46	0.74	−0.08
4,500	.....	.....	.....	.....	.....	.....	0.12	−0.37	0.99	+0.09	.....	.....
5,000	.....	.....	.....	.....	.....	.....	.....	.....	0.80	+0.09	.....	.....

TABLE 2.—*Free-air resultant winds (m. p. s.) during February, 1923.*

Altitude, m. s. l. (m.)	Broken Arrow, Okla. (233m.)				Drexel, Nebr. (396m.)				Due West, S. C. (217m.)				Ellendale, N. Dak. (444m.)				Groesbeck, Tex. (141m.)				Royal Center, Ind. (225m.)			
	Mean.		5-year mean.		Mean.		8-year mean.		Mean.		2-year mean.		Mean.		6-year mean.		Mean.		5-year mean.		Mean.		5-year mean.	
	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.
Surface	N. 27° E.	2.1	N. 19° W.	0.6	N. 67° W.	2.7	N. 66° W.	1.6	S. 78° W.	1.8	S. 75° W.	1.7	N. 71° W.	6.3	N. 48° W.	3.8	N. 40° E.	1.8	N. 38° W.	0.3	S. 80° W.	2.3	S. 81° W.	2.2
250	N. 30° E.	2.1	N. 22° W.	0.4	.....	.....	.....	.....	S. 79° W.	2.0	S. 78° W.	1.8	.....	.....	.....	.....	N. 61° E.	2.1	S. 84° W.	0.2	S. 86° W.	2.3	S. 79° W.	2.4
500	N. 43° E.	1.6	N. 34° W.	0.4	N. 62° W.	3.5	N. 71° W.	2.2	S. 78° W.	3.4	S. 82° W.	3.5	N. 72° W.	6.8	N. 51° W.	4.0	S. 74° E.	2.4	S. 30° W.	1.0	S. 86° W.	3.8	S. 67° W.	3.6
750	N. 67° E.	0.5	S. 53° W.	1.6	N. 58° W.	6.7	N. 70° W.	4.4	S. 75° W.	4.8	S. 80° W.	5.2	N. 71° W.	9.5	N. 56° W.	5.4	S. 46° E.	1.9	S. 40° W.	2.0	S. 88° W.	6.3	S. 70° W.	5.3
1,000	N. 83° W.	0.8	S. 61° W.	2.7	N. 55° W.	8.6	N. 67° W.	5.8	S. 76° W.	5.8	S. 76° W.	6.6	N. 67° W.	9.3	N. 53° W.	6.0	S. 7° W.	2.8	S. 57° W.	3.2	W.	9.4	S. 76° W.	6.8
1,250	N. 80° W.	2.0	S. 86° W.	3.6	N. 55° W.	10.5	N. 66° W.	7.0	S. 81° W.	6.9	S. 81° W.	8.3	N. 66° W.	10.5	N. 55° W.	7.0	S. 15° W.	3.6	S. 68° W.	4.3	N. 85° W.	10.0	S. 82° W.	8.2
1,500	N. 75° W.	4.3	N. 88° W.	4.5	N. 56° W.	12.1	N. 66° W.	9.0	S. 77° W.	8.9	S. 77° W.	10.1	N. 64° W.	11.2	N. 60° W.	8.3	S. 35° W.	4.3	S. 77° W.	5.5	N. 76° W.	11.1	S. 86° W.	9.6
2,000	N. 76° W.	6.8	N. 79° W.	6.8	N. 62° W.	12.8	N. 69° W.	10.8	S. 82° W.	13.9	S. 80° W.	13.9	N. 62° W.	13.5	N. 65° W.	10.4	S. 43° W.	5.6	S. 82° W.	7.7	N. 74° W.	12.6	N. 89° W.	11.1
2,500	W.	12.3	N. 75° W.	7.9	N. 62° W.	15.7	N. 69° W.	13.0	S. 83° W.	15.4	S. 82° W.	15.8	N. 63° W.	15.1	N. 68° W.	12.7	S. 62° W.	5.1	S. 88° W.	8.9	N. 62° W.	16.8	N. 84° W.	13.5
3,000	N. 81° W.	16.7	N. 82° W.	12.0	N. 69° W.	15.4	N. 74° W.	14.9	S. 84° W.	16.1	S. 84° W.	17.0	N. 65° W.	17.2	N. 71° W.	14.2	S. 81° W.	9.1	S. 86° W.	11.5	N. 56° W.	16.8	N. 85° W.	14.5
3,500	N. 70° W.	16.3	N. 68° W.	14.7	N. 72° W.	16.7	N. 73° W.	16.3	N. 89° W.	21.7	N. 89° W.	20.1	N. 66° W.	15.5	N. 73° W.	13.3	S. 84° W.	11.3	S. 87° W.	12.9	N. 51° W.	18.8	N. 82° W.	18.0
4,000	N. 57° W.	17.4	N. 65° W.	13.0	N. 70° W.	13.8	N. 81° W.	16.2	.....	.....	.....	.....	N. 68° W.	18.4	N. 69° W.	14.0	S. 88° W.	12.8	N. 87° W.	13.4	N. 39° W.	18.0	N. 80° W.	18.3
4,500	N. 68° W.	20.7	N. 58° W.	18.2	W.	19.0	N. 81° W.	18.3	.....	.....	.....	.....	N. 71° W.	19.0	N. 67° W.	14.7	N. 80° W.	15.6	N. 78° W.	15.0	.....	.....	.....	.....
5,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	W.	24.8	S. 76° W.	20.2	N. 45° W.	16.2	N. 45° W.	16.2	.....	.....	.....	.....

THE WEATHER ELEMENTS.

By P. C. DAY, Meteorologist, in Charge of Division.

PRESSURE AND WINDS.

The disturbed atmospheric conditions, so persistent during the first two months of the present winter, continued into February, although some reduction in the number of cyclones was noted, but anticyclones were numerous and frequently of marked strength.

The most important anticyclone of the month appeared in the far Canadian Northwest on the morning of the 12th, and during the following two days it gathered strength, moved southward, and by the morning of the 14th was central over the upper Missouri Valley where sea-level pressure was above 31 inches, the highest observed, 31.20 inches, being reported from Miles City, Mont. This anticyclone, gradually moving eastward and southeastward, dominated the weather in nearly all portions of the United States and Canada until near the end of the second decade. Severe cold was experienced in nearly all the States during that period, and cyclonic activity was greatly reduced, the storms usually entering the North Pacific States, and other sections being unable to penetrate the high pressure barriers.

The cyclones were usually not severe except during the 12th to 14th, when a low-pressure area passing over the Great Lakes and other northern districts, in conjunction with rapidly rising pressure to the westward caused heavy drifting snows, high winds, and severe blizzard conditions from Minnesota eastward to New York.

The pressure distribution for the month as a whole showed marked variations from the conditions usually expected in February. In the Canadian Northwest Provinces and the adjoining portions of the United States, the averages for the month were far above the normal. In fact, all sections of the United States and Canada, as far as the reports disclose, had averages above normal, a condition rarely experienced.

Also the changes in pressure from the preceding month, presented marked abnormalities. Usually the pressure for February is distinctly less than that for January, save for a few points in the Lake Superior district, where the change from winter to spring conditions is usually delayed by the heavy accumulations of snow and ice in that region, and along the immediate north Pacific coast, where the pressure usually does not begin to fall until March.

During February, just closed, the average pressure was higher than for the preceding month in all parts of the United States and Canada, save over the lower St. Lawrence Valley. In the western districts of both the United States and Canada the increases from January to February were everywhere unusually large.

The distribution of the average pressure, unusually high from the far Northwest southeasterly to the Gulf States, caused uniformly prevailing westerly winds to the northward of the ridge of highest pressure, and mainly northerly winds to the southward.

High winds prevailed over nearly all northern districts from the 12th to 14th, accompanying the most important barometric depression of the month. Some of the higher velocities noted were: 86 miles at Tatoosh Island, Wash.; 80, at Independence, Calif.; and 78, at Buffalo, N. Y. At Independence the velocity was most unusual, and covered an extensive area in the vicinity of that place. A full description of this storm with notes on damage appears on pages 82–83 of this issue.

Aside from high winds during the period indicated, there were few other winds of importance.

TEMPERATURE.

The unseasonable warmth which had continued during most of the two preceding months of the winter save over the Northeastern States terminated with the first few days of February, and the remainder of the month was distinctly cold, particularly until near the end of the second decade in the central and eastern districts and during nearly the entire month in the far Northwest.

The important cold periods were mainly during the early part of the first decade in the districts from the Mississippi Valley westward, except over the Northwest where the lowest temperatures frequently occurred on the 13th and 14th. East of the Mississippi Valley the 17th and 18th were decidedly cold, particularly in the Southeastern States, extending to the 19th at points in Florida. Over portions of the Ohio Valley and Middle Atlantic States the 24th was the coldest day of the month, while in the Northeastern States the 6th and 18th were the coldest days.

The warmest periods were the 1st and 2d over most of the Gulf and Atlantic Coast States; about the 12th and 13th from the Middle Plains eastward to the Ohio Valley and portions of the Middle Atlantic States; near the end of the second and the beginning of the third decade over much of the Rocky Mountains and Plateau regions; and in the far Northwest and over the Pacific Coast States on the 27th and 28th.

The first week was decidedly cold in the central Plateau region, the averages being from 15° to 20° or more below normal. The week was also colder than normal over all other districts of the country save from the central portions of Texas and Oklahoma eastward to the Atlantic coast. In the southern portions of this area the week was distinctly warm.

The second week of the month continued cold in all districts save over portions of the Gulf, and Middle and Southern Plains States, severe cold continuing generally in the central Plateau region. The third week was colder than normal over all portions of the country save the central and southern portions of the Rocky Mountain region, the southern portion of the Plateau and generally over California and Oregon. The week continued decidedly cold over all northern districts from Washington to New England. The final week of the month was mainly warmer than normal from the Mississippi Valley westward, but it continued cold to the eastward.

The month as a whole was colder than normal in nearly all parts of the country as shown by Chart III, at the back of this issue.

In the more Northeastern States and the Maritime Provinces of Canada, the month closed a period of cold that had continued the greater part of the winter, which, on account of the frequent and deep snow, the continued heavy snow cover and attending severe cold, may well be designated as an "old-fashioned winter." In the far Northwestern States the month was among the coldest, and in several States the coldest, of record for February.

Over a limited area from eastern South Dakota to southern Kansas, the month was slightly warmer than normal, and similar conditions existed, in portions of Georgia and Florida, along the Texas coast, generally over California, and over the Canadian Northwest.

PRECIPITATION.

To eastward of the Continental Divide the most important rainfalls of the month occurred about the 2d to 5th from the lower Mississippi Valley northeastward to the middle and southern Appalachians, and again over this region and as far as the Middle Atlantic coast districts about the 9th to 13th; in southern and southwestern Texas about the middle of the month; and from the 21st to 27th from west Texas eastward to the central portions of the Carolinas.

The rain first mentioned gave way to snow over the northern part of the area where the precipitation was heavy.

California had some light to moderate rains during the first 12 days, but virtually no precipitation afterward. The middle decade brought most of the precipitation that occurred in Oregon and Washington, the amounts being rather large over western Washington, where almost all portions had snow rather than rain.

The month's precipitation was less than normal over much more than half of the country. There was a considerable excess from southern New Mexico eastward over Texas and thence northeastward to the Ohio River and the Appalachian crest from Maryland to northern Georgia; and here the monthly amounts ranged from about 6 to 12 inches from south-central Texas to north-central Georgia. There was usually about the normal amount in the central and eastern portions of Colorado and Wyoming, and in North Dakota, northern Minnesota, and western Michigan.

Considerable deficiencies were noted in New England, near the coast to southward of Chesapeake Bay, especially over the Florida Peninsula, from Illinois westward and southwestward to the western borders of Nebraska, Kansas, and Oklahoma; and over most of the Plateau States, California, and western Oregon.

The scanty rainfall in Florida was very unfavorable, as drought prevailed over large portions of the State when the month began. In California the light precipitation during the month in most counties was considered unfortunate in its probable effects on the summer water supply. The central plains also were somewhat adversely affected by the February dryness.

SNOWFALL.

In the Northeast snowfall was not notably heavy, but owing to the low temperatures there was little melting at any time and deep snow cover remained.

About the 13th to 15th rather heavy snow from Minnesota to New York, continued with cold and high winds, caused great interference with traffic, several lives being lost in the North-Central States.

In the southern Middle Atlantic States, near the Ohio River, and especially in Missouri and Kansas there was decidedly little snow during February, and in Missouri and Kansas and near-by States the snowfall of the entire winter was the least of record.

Early in the month considerable snow for the latitude occurred from south-central Oklahoma to eastern Tennessee and the districts adjacent.

In the western half of the country the most notable snowstorm occurred in Washington and adjacent districts about the 11th to 14th. At lower levels the depths were generally from 12 to 20 inches, and there was much interference with traffic, especially around Spokane where the snow drifted greatly. In the Mountain districts of the far West the February snowfall was nearly everywhere less than normal, notably in Nevada and central and northern California. Somewhat more than normal occurred in Oregon and New Mexico.

The accumulated snowfall in the higher districts is, however, sufficient to promise a moderately good flow of water during the warmer season in all but a few districts.

RELATIVE HUMIDITY.

The relative amount of moisture in the atmosphere during the month was on the whole deficient, although in small areas it was distinctly in excess, among these were areas on the eastern slopes of the Rocky Mountains, from the lower Mississippi Valley westward to Arizona, and along the entire northern border, where there were many localities having percentages well above the normal.

In the middle plains the percentages were usually much less than normal, the deficiencies exceeding 20 per cent in some cases, and similar conditions existed over much of California.

SEVERE LOCAL STORMS, FEBRUARY, 1923.

[The table herewith contains such data as have been received concerning severe local storms that occured during the month. A more complete statement will appear in the Annual Report of the Chief of Bureau.]

Place.	Date.	Time.	Width of path (yards).	Loss of life.	Value of property destroyed.	Character of storms.	Remarks.	Authority.
Tunica and Tate Counties, Miss.	2					Wind	Fifteen persons injured; buildings blown down, and other property losses resulted.	Official, U. S. Weather Bureau.
Spokane, Wash.	12					Blizzard	Street car service hampered; business interfered with. No other damage reported.	Do.
Independence, Calif., and vicinity	12					High winds	Much damage to ranch houses, power lines, and telegraph poles.	Do.
Michigan, Minnesota, and Wisconsin.	13-14					Cold waves and blizzards.	Traffic demoralized; some loss of life; much property damage and many cases of frozen hands and feet. Complete suspension of train service in western Minnesota.	Do. Do.
Bismarck, N. Dak.	13-14					Blizzard	Train service interrupted; some branch lines not in operation for 7 days.	Do.
Baltimore, Md.	14					High winds	Windows broken; trees uprooted; small house unroofed; telephone and telegraph poles down.	Do.
Seattle and Tacoma, Wash.	14					Snow and ice	Wires broken; car service stopped; trains delayed; business interrupted.	Do.
Pittsburgh, Pa.	14-15					High wind	Plate-glass windows and signs damaged; telegraph and telephone poles down; numerous fires caused partly by high winds.	Do.

STORMS AND WEATHER WARNINGS.

WASHINGTON FORECAST DISTRICT.

Storm warnings.—Storm warnings were issued for the Atlantic coast from the Virginia Capes northward on the 2d and 3d in connection with a disturbance of considerable intensity which moved rapidly east-northeastward over the Lake Region and northern New England. However, no winds of verifying velocity were reported.

The next warnings were issued for the coast from Cape Hatteras to Atlantic City at 10 a. m. of the 5th, at which time a disturbance was central over the eastern Gulf of Mexico and a strong high-pressure area was over the Lake Region and the Middle Atlantic States. These warnings were verified.

At 1 p. m. of the 12th pressure was quite high over northern New England and falling very rapidly over the Lake region and the Ohio Valley and southeast storm warnings were ordered displayed from the Virginia Capes to Eastport, Me. Verifying velocities were reached at a number of stations, the highest, 48 miles an hour from the southeast, occurring at Nantucket, Mass.

On the 14th pressure was abnormally high west of the Appalachian Mountains and low over New England, and northwest storm warnings were displayed from Cape Hatteras to Nantucket, Mass. The highest velocities reported were 72 miles an hour at New York City and 60 miles at Block Island, R. I., both from the northwest.

The last storm warnings of the month were orderd displayed at 10 p. m. of the 17th on the Atlantic coast